

# FERC Order No. 2222:

## Participation of DER Aggregations in Wholesale Markets

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PJM Interconnection

## Wholesale DER

### 1 GW Demand Response

#### Customer-sited generation:

Offers into capacity, energy and/or ancillary services markets

84%  
Diesel

15%  
Natural  
Gas

1%  
Other

Remaining ~8 GW of DR is load modification without any generation (e.g., industrial process management)

### ~2 GW Generator

**Front-of-the-meter generation:** Offers into capacity, energy and/or ancillary services markets

Can be sited at customers

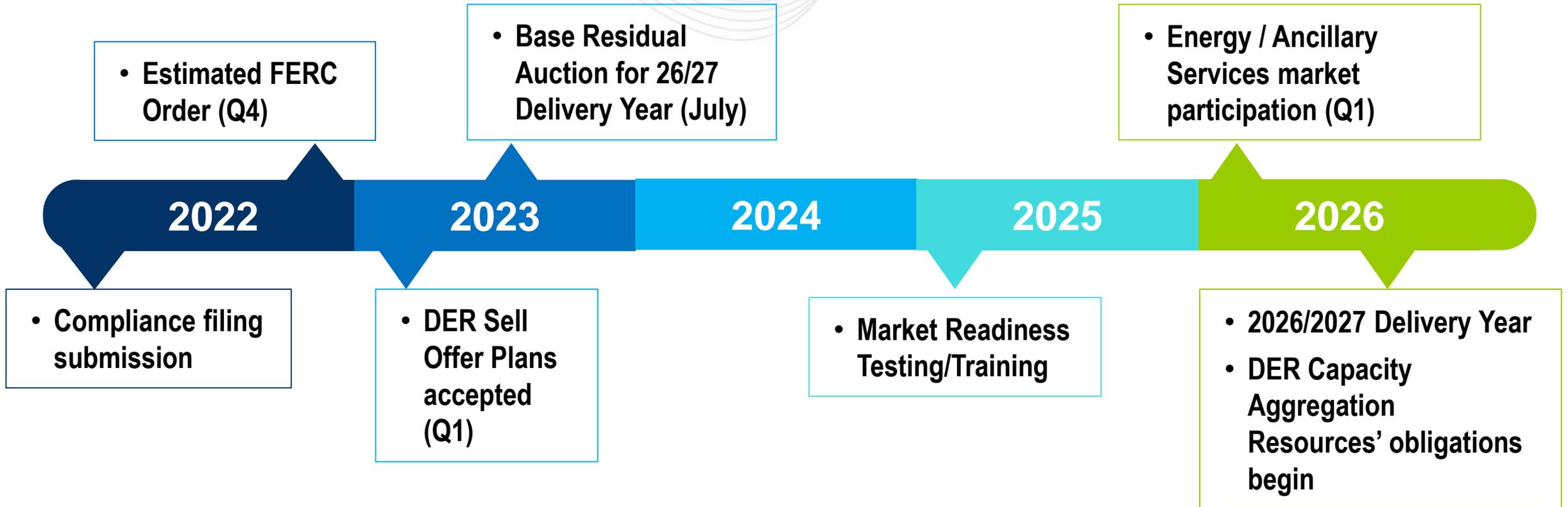
**Mostly solar but also other fuels**

## Non-Wholesale DER

### ~10 GW DER

- **Solar PV DER:** Retail/rooftop solar
- **Municipal DER:** Municipal electric company distribution-level generators
- **Process DER:** Industrial generators, combined heat and power
- **Resilience DER:** Emergency backup
- **Qualified Facilities:** Direct sales to distribution utilities

# Estimated Implementation Timeline



## Jurisdiction & Interconnection

1. Interconnection
2. Market Participation Agreements
3. Opt-in for Small Utilities

## Operations

1. Locational Requirements
2. Distribution Factors
3. Telemetry
4. Operational Needs

## Market Design

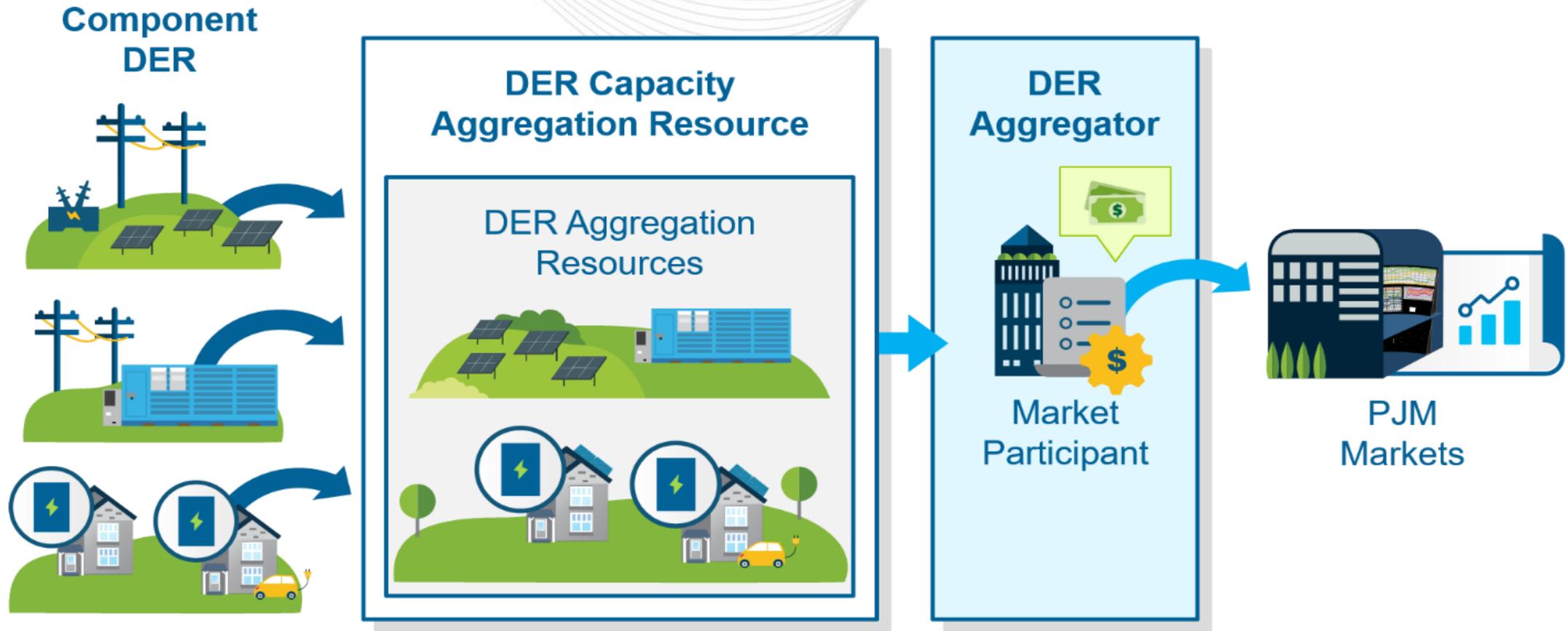
1. Market Participation Model
2. Type of Technology (Homogenous / Heterogeneous)
3. Bidding Parameters
4. Min./Max. Size Requirements

## Settlements

1. Metering Configuration
2. Settlement requirements
3. Double Counting Services
4. Use case development

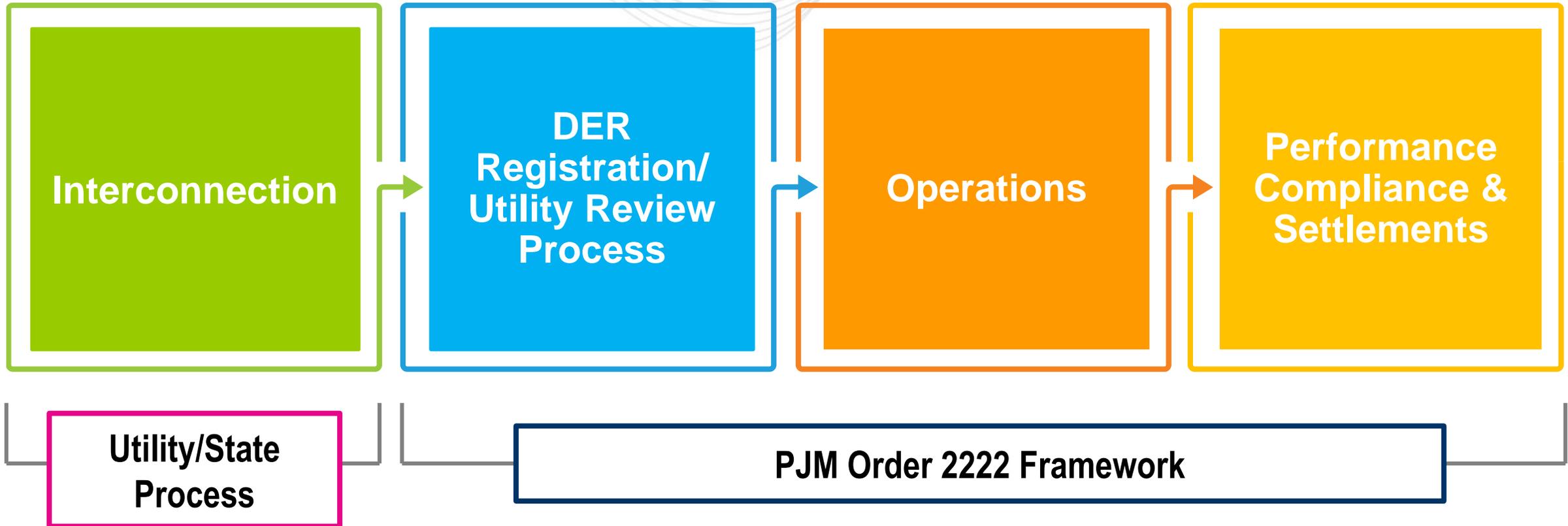
## Coordination

1. DER Registration
2. Utility Coordination
3. Modification to List of Resources
4. State Regulatory Authorities



	MARKET		
	Energy	Capacity	Ancillary Service Only
<b>Locational Requirements</b>	<ul style="list-style-type: none"> <li>Aggregate DER up to primary transmission load bus (~10,000 in PJM)</li> <li>Nodal aggregation</li> </ul>	<ul style="list-style-type: none"> <li>Aggregate DER up to capacity zone (~25 zones in PJM)</li> <li>Multi-nodal aggregation</li> </ul>	<ul style="list-style-type: none"> <li>Aggregate DER up to transmission zone level (~20 zones)</li> <li>Multi-nodal aggregation</li> </ul>

**Transmission *constraint control* and *pricing* for each market product were key considerations**



1. **Registration / Utility Review Process:** Prior to approving an aggregation for market participation, Utility reviews and approves a dispatchable range for the proposed aggregation.
  - Aggregations submitting ranges the Utility cannot reliably integrate on a “normal” basis should be denied (or modified).
2. **Day-Ahead:** Prior to day-ahead submittal, Utilities and Aggregators should coordinate an agreed upon range of MW dispatch per hour for Aggregator to submit to market.
3. **Real-Time:** For reliability concerns, any action the Utility deems necessary shall be executed by the Aggregator.
  - Utility should provide explanation *after the fact* as to the reliability concern

\*Aggregations are not eligible for lost opportunity costs or performance excusals due to Utility override and will be subject to any applicable charges/penalties.

- Net Energy Metering Participation
  - PJM's proposal is to allow A/S participation and disallow Capacity and Energy participation by default. PJM has built in a release value to evaluate specific use cases for a change to participation
  - Important checks are (1) ensure no double counting for retail <> wholesale compensation and (2) ensure all PJM participation requirements are met
- PJM has observed some diversity in net energy metering tariffs among states and believe the release value will be able to support the flexibility for NEM tariff differences and evolution